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CONFLICTING SCIENTIFIC NARRATIVES AT THE CONVENTION ON BIOLOGICAL DIVERSITY AND OTHER FORA: ANALYSIS AND CONTRADICTION IN THE DISCUSSIONS ON DEMATERIALIZATION OF (PLANT) GENETIC RESOURCES

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ABSTRACT

This article examines the use of scientific arguments in negotiations on the status of Digital Sequence Information (DSI), focusing on the Convention on Biological Diversity (CBD), the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), and the Pandemic Influenza Preparedness Framework (PIP). DSI is a placeholder term used in negotiations on the dematerialization of genetic resources: the ability to sequence "physical" genetic resources and use this "intangible" information, which radically changes research practices. The CBD (among other instruments) establishes rules for Access to the Genetic Resource and the Fair and Equitable Sharing of Benefits from their utilization (ABS). This applies to "physical" genetic resources, but it is not clear for DSI. Indeed, different legal interpretations and political narrative are conflicting over the integration of DSI into these legal frameworks. This article explores how science is used in these negotiations, particularly in its rhetorical and epistocratic dimensions. The methodology combines an interdisciplinary approach (legal technique, philosophy of law and science) and a comparative discourse analysis: on the terminology; the inclusion of DSI in the definition of genetic material; and the inclusion of DSI in ABS systems. While scientific arguments play a crucial role in this technical issue, this article shows that scientific arguments can be used to support political positions (under the guise of objectivity and neutrality), and that this use of scientific arguments is not consistent, even contradictory (between PIP and CBD/ITPGRFA).

Keywords: Digital Sequence Information; Genetic Sequence Data; International Treaty on Plant Genetic Resources for Food and Agriculture; Convention on Biological Diversity; Scientific argument; Epistocracy

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Conflicting Scientific Narratives at the Convention on Biological Diversity and Other Fora: Analysis and Contradiction in the Discussions on Dematerialization of (Plant) Genetic Resources

1. INTRODUCTION

This contribution presents international negotiations regarding the legal status of Digital Sequence Information (DSI), focusing on a critical analysis of the rhetoric and epistocratic use of science in these debates.[1] The DSI issue is at the heart of a number of major preoccupations within the various instruments, treaties and conventions on the sustainable use and Access and Benefit-sharing (ABS) of genetic resources.[2] Although several instruments are involved, this paper focuses on the Convention on Biological Diversity (CBD), the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), and the Pandemic Influenza Preparedness Framework (PIP). In other words, the CBD its Nagoya Protocol (NP) cover all genetic resources, while other treaties or frameworks exist for specific areas, such as seeds, viruses, marine resources, etc. What these instruments have in common is that they contain ABS rules: genetic resources are subject to access rules based on the prior and informed consent, and the benefits arising from their use must be shared equitably.[3]

Over the last decade, these various instruments have been undermined by the dematerialization the possibilities of sequencing genetic resources. DSI are at the heart of intense political tensions, but it is also a complex subject. According to Frison, DSI encompasses "the information and knowledge content of genetic material [that could be] extracted, processed and exchanged in its own right, detached from the physical exchange of the plant genetic material".[4] At this point, we emphasize that the type of information and data included under the term DSI is not necessarily defined and is still under discussion. In the current case, the term DSI can include nucleic acid sequence information, as well as associated data such as sequence assembly, gene expression, and especially phenotypic and environmental data, including traditional knowledge.[5] A study commissioned by the CBD classified DSI into four categories of information: DNA and RNA (group 1); group 1 and proteins (group 2); group 2 and metabolites (group 3); and group 3 and associated contextual information.[6] This sequencing applies to seeds, pathogen samples, marine genetic resources, covering a vast range of biodiversity, previously regulated in international public law in their physical dimension.[7]

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1 Alexandre Viala, *Demain, l'épistocratie ?* (Mare Martin 2022).
2 Christine Frison, *Redesigning the Global Seed Commons* (Routledge 2018) 86.
3 Jacob S Sherkow and others, 'Ethical, Legal, and Social Issues in the Earth BioGenome Project' (2022) 119 Proceedings of the National Academy of Sciences 5.
4 Frison (n 2) 83.
5 Ibid.
6 Wael Houssen, Rodrigo Sara and Marcel Jaspars, 'Digital Sequence Information on Genetic Resources: Concept, Scope and Current Use' (2020) U.N. Doc. CBD/DSI/AHTEG/2020/1/3 <https://www.cbd.int/doc/c/fef9/2f90/70f037ccc5da885dfb293e88/dsi-ahteg-2020-01-03-en.pdf>.
7 Abbie-Rose Hampton, 'Pathogen Dematerialization and the ABS Loophole' (2023) 10 Journal of Law and the Biosciences 3.

The challenges raised by the recent possibilities of dematerializing genetic resources profoundly impact the economy of the food system, health, and biotechnology.[8] In the current situation, researchers, breeders and the bioindustry are making intensive use of these DSI, without triggering ABS mechanisms (applicable to physical genetic resources). Several countries and activists denounce digital biopiracy because of DSI utilization, as genetic resources are extracted, sequenced, published, commercialized, and privatized without the consent of the provider countries.[9] Unlike physical genetic resources, DSI do not allow states to exercise their sovereignty: the use of DSI is not transparent, and tracking is nearly impossible (in terms of the quantity of data used, actors involved, and academic vs. commercial objectives).[10] Indeed, DSI is stored in openly accessible databases without prior consent or benefit-sharing.[11] These databases are widely used by scientific communities for fundamental and applied research, vaccine development, plant improvement, or biotechnological applications.[12] We use the term DSI as a placeholder term used in negotiations by international organizations.[13] As detailed above, several contracting parties prefer the term "Genetic Sequence Data" (GSD), more commonly used in the scientific community but with a narrower scope.[14]

Faced with these new technologies, international negotiations in various treaties and conventions have sought to define DSI and decide on their legal status. Yet, international discussions struggle to determine whether DSI and dematerialized genetic resources fall within the scope of the regime for "physical" genetic resources: what rights and obligations arise

8 Dirk Neumann, and others, 'Global Biodiversity Research Tied up by Juridical Interpretations of Access and Benefit Sharing' (2017) 18 Organisms Diversity & Evolution; Marcos Ezequiel Filardi and Stefano Prato, 'La Remise En Question de La Dématérialisation Des Systèmes Alimentaires, Condition Sine qua Non Pour Reprendre En Main Le Futur de l'alimentation' in L'observatoire pour le droit à l'alimentation et à la nutrition, *Dématérialisation de l'alimentation : aborder de front les défis de l'ère numérique* (2018),; Frison (n 2).

9 Margo A Bagley, '"Just" Sharing: The Virtues of Digital Sequence Information Benefit-Sharing for the Common Good' (2022) 63 Harvard International Law Journal 21, 22.

10 Sarah Laird and Rachel Wynberg, 'A Fact Finding and Scoping Study on Digital Sequence Information on Genetic Resources in the Context of the Convention on Biological Diversity and Nagoya Protocol' (2018), U.N. Doc. CBD/DSI/AHTEG/2018/1/3 <https://www.cbd.int/doc/c/b39f/4faf/7668900e8539215e7c7710fe/dsi-ahteg-2018-01-03-en.pdf>.

11 For example, see the NCBI database: <https://www.ncbi.nlm.nih.gov/>; Sylvain Aubry, 'The Future of Digital Sequence Information for Plant Genetic Resources for Food and Agriculture' (2019) 10 Frontiers in Plant Science 6; Houssen, Sara and Jaspars (n 6) 12.

12 Molly R Bond and Deborah Scott, 'Digital Biopiracy and the (DSI) Assembling of the Nagoya Protocol' (2020) 117 Geoforum 24, 29; Rachel Wynberg and others, 'Farmers' Rights and Digital Sequence Information: Crisis or Opportunity to Reclaim Stewardship Over Agrobiodiversity?' (2021) 12 Frontiers in Plant Science 2.

13 Anis Bendimred and Christine Frison, 'Séquençage des données issues des ressources génétiques : trouble-fête du régime international d'accès et de partage des avantages du Protocole de Nagoya' (2021) Annales de droit de Louvain (ADL) 2, 381, 408.

14 Rachel Wynberg and others, 'Farmers' Rights and Digital Sequence Information: Crisis or Opportunity to Reclaim Stewardship Over Agrobiodiversity?' (2021) 12 Frontiers in Plant Science 2; Sylvain Aubry and others, 'Bringing Access and Benefit Sharing into the Digital Age' (2022) 4 Plants, People, Planet 5, 6.

from their use (information and prior consent from the provider, benefit-sharing, etc.).[15] In this context, many discussions explored whether DSI should be included in the definitions of "genetic resource," "genetic material," or "use of genetic resources" in various instruments, treaties and conventions.[16] More recently, discussions have shifted focus to inclusion of ABS to DSI, overshadowing the question of genetic material. Ultimately, international discussions on DSI are far from resolved, even though the December 2022 Conference of the Parties (COP) of the CBD paved the way for a multilateral system and a global fund to integrate the benefit that may be derived from the use of DSI, along with an agreement that these benefits must be shared equitably (Decision 15/9[17]). This decision was endorsed by the latest meeting of the governing body of the ITPGRFA in November 2023 (GB10, Resolution 16/2023[18]).

In this contribution, we analyze some conflicts of interpretation and arguments that arose during the negotiations and how science was used as an argument to address them. Using DSI as a case study, we aim to analyze how science is used in an epistocratic manner, as a rhetorical tool to strengthen legal or political arguments.[19] Without questioning the importance of scientific arguments in these technical debates, we want to examine how a scientific message (despite uncertainties, conflicts of interest, and biases) can be used as an "objective" argument, transcending political discussions (or their social consequences).[20] The issue of DSI is undeniably very technical, but it raises ethical questions where scientific discourses must be received cosmopolitically: with caution and considering all divergent interests.[21]

2. METHODOLOGY

To address this issue, we propose an interdisciplinary approach incorporating legal technique, legal philosophy, and philosophy of science.[22] The research questions can be summarized as follows:

- How States mobilize scientific arguments in DSI negotiations under the CBD, ITPGRFA and PIP (RQ1)?

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15 Wynberg and others (n 14) 2.

16 Charles Lawson, Fran Humphries and Michelle Rourke, 'The Future of Information under the CBD, Nagoya Protocol, Plant Treaty, and PIP Framework' (2019) 22 The Journal of World Intellectual Property 103, 4.

17 <https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-09-en.pdf>.

18 <https://openknowledge.fao.org/server/api/core/bitstreams/74318344-b021-402e-82c1-b19cf024fc51/content>.

19 Aubry and others (n 14) 6; Bond and Scott (n 12).

20 Viala (n 1) 17; Bruno Latour, *Politics of Nature: How to Bring the Sciences into Democracy* (Harvard University Press 2004) 25.

21 Isabelle Stengers, *Cosmopolitiques* (Empêcheurs de penser rond 2022) 59.

22 Olivier Corten, *Méthodologie du droit international public* (Université de Bruxelles 2017) 30; Véronique Champeil-Desplats, *Méthodologies du droit et des sciences du droit* (Dalloz 2022).

- Are there any strategic, even epistocratic, uses of scientific arguments in these debates to support political or legal positions (RQ2)?

Research objective is to gain a general overview of the use of scientific arguments in DSI negotiations (RO1), to highlight the strategic and epistocratic uses of science in these negotiations in order to promote greater transparency and political *positionality* rather than dependence on a supposedly neutral and objective science (RO2).

Author has proposed two hypotheses. First, whether in a general sense or applied to DSI specifically, actors involved in negotiations deploy scientific narratives to justify decisions and interpretations favorable to their interests (H1). In a sense, we suggest that parties negotiating DSI use scientific narratives not to adhere to the scientific method of knowledge creation, but to construct a political argument.[23] The second hypothesis suggests that various agro-industrial actors, Global North countries, and scientific communities with clear interests in DSI liberalization have advocated for a restrictive interpretation of ABS regime to exclude DSI (H2).[24] Consequently, in the absence of consensus on the problematization of DSI, they use scientific narratives to support positions more legal and political than scientific.[25]

This article begins with a theoretical chapter to identify the international legal framework applicable to genetic resources and specialized systems. This section will also address the issues related to the sequencing of these resources, which we approach as a hybrid problem (in the sense of Latour and Stengers. Although primarily a legal question (the inclusion of DSI in these legal frameworks)[26], distinct issues are subject to different interests, and as we will demonstrate, scientific narratives used to support arguments are not articulated in the same manner and may even be contradictory.

In the second section, author provides an empirical analysis of the use of scientific arguments in the positions of states within different treaties (CBD, ITPGRFA, and PIP). The observed period start is between 2013 (the start of PIP revision negotiations) to November 2022. The analysis is divided into three phases: the definitions and uses of terms for DSI, the integration of DSI into the definitions of "genetic material," and ABS mechanism. The analysis of definitions will compare states' positions for COP15 regarding the preferred use of terms. We will compare states' positions and discourse on terms and juxtapose them with their positions on the following subjects. For

[23] Claire A Dunlop, 'The Possible Experts: How Epistemic Communities Negotiate Barriers to Knowledge Use in Ecosystems Services Policy' (2014) 32 Environment and Planning C: Government and Policy 208; Viala (n 1) 17.

[24] Stuart J Smyth and others, 'Implications of Biological Information Digitization: Access and Benefit Sharing of Plant Genetic Resources' (2020) 23 The Journal of World Intellectual Property 267, 270.

[25] Bond and Scott (n 12) 27.

[26] Stengers, *Cosmopolitiques* (n 21) 565; Bruno Latour, *We have never been modern* (Harvard University Press 1993) 1.

these, we have undertaken a comparative analysis of submitted positions of states in the three international instances (CBD, ITPGRFA, and PIP): Australia, Germany (we refer to the EU for the CBD), the United States (observer at the CBD) and Third World Network. The study is restricted to these states/stakeholders because they were the only ones that provided comments in all the three international bodies analyzed.[27]

This comparative analysis will demonstrate that the use of scientific rhetoric is not consistent. The appeal to a "science-based policy" is crucial in the exercise of defining DSI. This is not without consequence, as the term will influence the selected and framed materials. On the other two subjects (genetic material and ABS), different positions have been advocated by the same states in different instances, asserting reliance on scientific ground (claiming that DSI is not "scientifically" a genetic resources) and on arguments favoring science development (advocating for open access to DSI).

3. THE REGIME COMPLEX OF GENETIC RESOURCES AND THE DSI

This section aims to identify the Regime Complex of genetic resources and seeds, and the implications of Digital Sequence Information (DSI) on it. We will then theorize the argumentative use of sciences in DSI negotiations as a "hybrid" subject. For Latour, hybrids refer to issues that go beyond object/subject frameworks (such as ozone layer holes, mad cow disease, etc.), requiring a technical approach and leading to significant social consequences for heterogeneous actors.[28] We want to address DSI and its consequences on the agri-food system as a hybrid problem.[29] Indeed, DSI combines technically uncertain issues with contradictory objectives, having a major societal impact on political and industrial actors, farmers, and indigenous communities. In the context of DSI, scientific problematization is not neutral and objective, as narratives influence international negotiations and legislative choices.[30]

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27 The documents analyzed are as follows: ITPGRFA, 'Compilation of information on "digital sequence information" with respect to plant genetic resources for food and agriculture' (2019) U.N. Doc. IT/GB-8/19/16.1/Inf.1. <https://www.fao.org/3/na770en/na770en.pdf>; ITPGRFA, 'Consideration of Digital Sequence Information in Accordance with Resolution 13/2019 and the Multi-Year Programme of Work' (2022) U.N. Doc. IT/GB-9/22/17.2 Rev.1. <https://www.fao.org/3/cc1508en/cc1508en.pdf>; CBD, 'Compilation of views and information on digital sequence information on genetic resources submitted pursuant to paragraphs 9 and 10 of decision 14/20' (2020) U.N. Doc. CBD/DSI/AHTEG/2020/1/INF/1. <https://www.cbd.int/doc/c/abcf/b9df/be9859f376997cf8cc00d175/dsi-ahteg-2020-01-inf-01-en.pdf>; PIP Framework, 'Implementation of Decision WHA70(10) 8(b) - Compilation II. GSD Analysis, (2017) U.N. Doc. <https://cdn.who.int/media/docs/default-source/pip-framework/governance/analysis-of-seasonal-influenza-gsd-under-the-pip-framework/related-documents/gsdcompilation.pdf?sfvrsn=6b4945bf_6>.

28 Latour, *We have never been modern* (n 26) 11; Gerard de Vries, *Bruno Latour* (Polity Press 2016) 149.

29 Kunihiko Kobayashi, Eiji Domon and Kazuo N Watanabe, 'Interaction of Scientific Knowledge and Implementation of the Multilateral Environment Agreements in Relation to Digital Sequence Information on Genetic Resources' (2020) 11 Frontiers in Genetics 1028, 4; Stephen R. Dovers, Tony W Norton and John W Handmer, 'Uncertainty, Ecology, Sustainability and Policy' (1996) 5 Biodiversity & Conservation 1143.

30 Bagley (n 9) 6.

3.1. The Regime Complex of Genetic Resources

Genetic resources, including those for food and agriculture, are part of a "Regime Complex" because several independent treaties coexist and co-regulate this subject without clear hierarchy.[31] Applying to all genetic resources, the CBD and its Nagoya Protocol constitute the general framework for ABS. Several treaties and specialized international bodies then regulate specific types of genetic resources: for example, marine genetic resources, seeds, viruses.[32] In addition to ABS system, genetic and plant genetic resources are subject to intellectual property rights under the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS). In addition, the International Union for the Protection of New Varieties of Plants (UPOV) has adapted *sui generis* intellectual property rights for plant varieties (stimulating plant breeding). Finally, genetic resources are also influenced by the standards and regulations of other specialized international organizations.[33]

The conservation of the biological diversity of genetic resources is a cross-cutting objective, as is the sustainable use of its components and the fair and equitable sharing of benefits arising from the use of genetic resources.[34] Moreover, the CBD recognizes the sovereign right of states over their genetic resources, so access is granted only with prior informed consent (PIC) and under mutually agreed terms (MAT). In summary, access to genetic resources is negotiated in exchange for benefit sharing through a bilateral contract, which is sometimes criticized for being lengthy and complex.[35]

The ITPGRFA is a specialized treaty for seeds that establishes a multilateral system in which they are collectively exchanged (ITPGRFA, Art. 10-13).[36] This multilateral system aims to facilitate access to seeds while ensuring fair and equitable sharing of benefits from their use. Listed in Annex I of the ITPGRFA, the multilateral system covers 64 of major cultivated species (representing 80% of human consumption).[37] Another ABS instrument is the World Health Organization's (WHO) Pandemic PIP Framework is also a specialized mechanism for influenza virus samples.[38] The PIP framework is based on facilitated access to viruses between

[31] Kal Raustiala and David G Victor, 'The Regime Complex for Plant Genetic Resources' (2004) 58 International Organization 277, 283; Sebastian Oberthür and Justyna Pożarowska, 'Managing Institutional Complexity and Fragmentation: The Nagoya Protocol and the Global Governance of Genetic Resources' (2013) 13 Global Environmental Politics 100.

[32] Frison (n 2) 71; Julia Tschersich, 'Norm Conflicts as Governance Challenges for Seed Commons: Comparing Cases from Germany and the Philippines' (2021) 7 Earth System Governance 100097, 2–3.

[33] Tschersich (n 32) 2–3.

[34] Lawson, Humphries and Rourke (n 16) 117; Jon Ambler and others, 'Including Digital Sequence Data in the Nagoya Protocol Can Promote Data Sharing' (2021) 39 Trends in Biotechnology 116, 116.

[35] Charles Lawson and Michelle Rourke, 'Digital Sequence Information as a Marine Genetic Resource under the Proposed UNCLOS Legally Binding Instrument' (2020) 122 Marine Policy 103878, 3.

[36] Wynberg and others (n 14) 8.

[37] Bond and Scott (n 12) 22; Frison (n 2) 85.

[38] Bond and Scott (n 12) 22; Frison (n 2) 85.

laboratories (assessing pandemic risks and developing vaccines) and sharing the benefits of their use (distribution of drugs or vaccines).[39] This sharing is ensured through a series of standard material transfer agreements between WHO laboratories (SMTA1) and third parties (SMTA2).[40]

3.2 The Access and Benefit-Sharing (ABS) Regime in the Face of DSI

Over the past twenty years, technical advances have accelerated and reduced the costs of sequencing genetic resources. The production of DSI, and their publication on databases has experienced exponential growth.[41] DSI are now component of modern scientific research and might allow a more precise and comprehensive description of genetic resources. Contrary to its physical samples, DSI are conveniently, simply, and freely available in public databases (based in the United States, Europe, and Japan).[42] For example, the development of the COVID-19 vaccine was facilitated, in part, by the sharing of DSI on the SARS-CoV-2 virus.[43] However, the unregulated use of DSI is also strongly contested. As mentioned, their legal status is uncertain, and this could lead to the erosion of the entire ABS system.[44] Indeed, although DSI are produce regardless the type of genetic resource (plants, viruses, animals, etc.), the ABS regime subdivides and follows distinct guidelines based on specific regulatory frameworks for genetic resources, leading to digital and institutional fragmentation of the Regime Complex.

For example, agri-food companies can use DSI to identify and access genetic resources belonging to indigenous or local communities. These companies can then develop plant varieties protected by intellectual property rights, imposing usage restrictions, even on the local communities.[45] These companies can access sequenced genetic material for free without negotiating or compensating holders of genetic resources and local knowledge, while they can later privatize the use of physical genetic resources through intellectual property systems (patents and protections on

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39 Sam F Halabi and Rebecca Katz (eds), *Viral Sovereignty and Technology Transfer: The Changing Global System for Sharing Pathogens for Public Health Research* (Cambridge University Press 2020) 197.

40 Ibid; Hampton (n 7) 3.

41 Ambler and others (n 34); Frison (n 2) 83; Charles Lawson, Fran Humphries and Michelle Rourke, *Access and Benefit Sharing of Genetic Resources, Information and Traditional Knowledge* (Routledge, 2022).

42 Bond and Scott (n 12); Aubry and others (n 14); Zachary D Stephens and others, 'Big Data: Astronomical or Genomical?' (2015) 13 PLOS Biology e1002195; Christopher HC Lyal, 'Digital Sequence Information on Genetic Resources and the Convention on Biological Diversity' in Evanson Chege Kamau (ed), *Global Transformations in the Use of Biodiversity for Research and Development: Post Nagoya Protocol Implementation Amid Unresolved and Arising Issues* (Springer International Publishing 2022) 591.

43 Bond and Scott (n 12); Aubry and others (n 14); Stephens and others (n 39); Lyal (n 39) 591.

44 Aubry and others (n 14) 6; Eric Welch and others, 'Potential Implications of New Synthetic Biology and Genomic Research Trajectories on the International Treaty for Plant Genetic Resources for Food and Agriculture' (2017) A study commissioned by the Secretariat of the International Treaty on PGRFA, FAO 36.

45 Bagley (n 9) 21, 22; Filardi and Prato (n 8) 13.

plant varieties).[46] The contrast is striking genetic varieties circulating globally now exist in the form of freely accessible DSI, while the physical exchange of seeds among farmers faces legal and technical obstacles in some countries.[47]

In short, although scientific communities may have implemented the dematerialization process of genetic resources in good faith for biodiversity conservation, this process is paradoxically co-opted by agri-food and bioeconomy companies and their practices of capitalization and appropriation of biodiversity.[48] This unlimited access to DSI, favouring companies and laboratories in the Global North, is the result of a carefully maintained status quo regarding the difference between "physical" and "immaterial" genetic resources.[49] In this path, sharp tensions and blockages emerge in international negotiations on DSI regarding their (non)regulations and the application of ABS rules. We will further elaborate on the frontal oppositions between the North and the South regarding the definition, scope, and implications of DSI.[50]

4. CASE STUDIES: DIVERGENCE IN SCIENTIFIC NARRATIVE

In these wicked and hybrid issues related to DSI, we will focus on the argumentative and rhetorical uses of science. In previous research, we analyzed the roles, functions, and risks of scientific arguments used in politics and law, and we will apply the main conclusions to the specificities of DSI. In broad strokes, we are critical of the epistocratic use of scientific arguments to claim a supposed *neutral* and *objective* truth and to assert authority in *subjective* political discussions.[51] We use the concept of epistocracy to theorize our hypotheses, which refers to an ideal type of justification where power is exercised by holders of scientific knowledge.[52] Although there is no formal epistocratic regime, this concept helps identify the emergence of a justification of political positions based on technical and scientific objectivities, as seen in *science-based policies* narratives.[53]

This section will provide a casuistic analysis of recent negotiations concerning DSI, focusing on the use of scientific narratives. To study arguments put forwards by contracting parties, we propose analyzing

46 Bendimred and Frison (n 13) 384; Hélène Tordjman, *La croissance verte contre la nature* (La découverte 2021) 189; Laurelyn Whitt, *Science, Colonialism, and Indigenous Peoples: The Cultural Politics of Law and Knoledge* (Cambridge University Press, 2009) 157.
47 Filardi and Prato (n 8) 13.
48 Bond and Scott (n 12) 29.
49 Frison (n 2) 83.
50 Bond and Scott (n 12) 25; Frison (n 2) 83; Bendimred and Frison (n 13) 404.
51 Latour, *We Have Never Been Modern* (n 26); Latour, *Politics of Nature* (n 20); Viala (n 1) 17; Pierre Walckiers, 'The use of scientific arguments as a mode of justification. What place does it have in politics and law? A case study of EU GMO regulation' (2023) De Europa 178-184. <http://hdl.handle.net/2078/272904>.
52 Viala (n 1) 17.
53 Ibid 19.

scientific arguments in the form of narratives and justifications.[54] There, contracting parties use these scientific/technical narratives in a general manner in their positions, without referencing specific scientific data. In our views, scientific narratives are strategically used in discourse to reinforce the legitimacy of positions: science is presented as the preferred means when dealing with reality, science-based policies are considered more rational, logical, and analytical, and scientific approaches are guided by long-term considerations for society, unlike political interests.[55] On this point, Favre had shown that international relations were a fertile ground for the epistocratic use of sciences to technicalize and depoliticize sensitive issues. Consequently, international organizations will produce technical knowledge, which may collide and contradict based on their distinct objectives.[56]

We will demonstrate that parties tend to mobilize scientific data not with the aim of creating knowledge but to construct arguments within the negotiation framework. We conducted a comparative analysis of positions and discourses between the submissions of states and stakeholders regarding DSI/GSD issues in the CBD, ITPGRFA and PIP, which we subdivided into three areas: term usage, connection with the definition of "genetic material," and relation to ABS mechanism.

4.1 The Use of Term: GSD and DSI

To contextualize, the term DSI is a generic term used in CBD and ITPGRFA negotiations, revealing tensions and divergences.[57] Several state submissions acknowledge it as a generic term, with some emphasizing that the scientific community uses the term "Genomic sequence data".[58] Given that many types of data and information can be included under the DSI umbrella, a study commissioned by the CBD theorized four increasingly inclusive groups:[59]

- Group 1: DNA and RNA.

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54 Elizabeth A Shanahan, Michael D Jones and Mark K McBeth, 'How to Conduct a Narrative Policy Framework Study' (2018) 55 The Social Science Journal 332; Jonas Tallberg and Michael Zürn, 'The Legitimacy and Legitimation of International Organizations: Introduction and Framework' (2019) 14 The Review of International Organizations 581.

55 Maarten Hajer and Wytske Versteeg, 'A Decade of Discourse Analysis of Environmental Politics: Achievements, Challenges, Perspectives' (2005) 7 Journal of Environmental Policy & Planning 175; Bob Kreiken and Bas Arts, 'Disruptive Data: How the Access and Benefit-Sharing Discourses from the Convention on Biological Diversity Structured Ideas and Decisions on Digital Sequence Information in the Period 2016 – 2022' (2024) SSRN Scholarly Paper. Rochester, NY. <https://doi.org/10.2139/ssrn.4788655>.

56 Jérôme Favre, 'Épistocratie et droit global' in Alexandre Viala, *Demain, l'épistocratie?* (Mare & Martin 2022) 121.

57 Ambler and others (n 34); Bendimred and Frison (n 13) 408.

58 Bagley (n 9); Wynberg and others (n 14) 2; Aubry and others (n 14) 1.

59 Bagley (n 9) 6; Houssen, Sara and Jaspars (n 6); Chidi Oguamanam, 'Indigenous Peoples' Rights in Equitable Benefit-Sharing Over Genetic Resources: Digital Sequence Information (DSI) and a New Technological Landscape' in Dwight Newman, *Research Handbook on the International Law of Indigenous Rights* (Edward Elgar Publishing 2021) 371.

- Group 2: group 1 and protein sequences.
- Group 3: group 2 and the resulting metabolites.
- Group 4: group 3 and associated knowledge, traditional knowledge, ecological interactions.

The situation differs in the PIP framework, where there is already an agreement on the term GSD instead of DSI. In fact, the CBD COP15 agreement marked an evolution in the discussions, as states agreed to use the term DSI as placeholder terms, leaving a constructive ambiguity (Decision 15/9[60]). Proof of the compromise, this latest decision concedes a difference of opinion on the inclusion of DSI in the scope of the treaty. However, the recent GB10 of ITPGRFA as both terms are associated: DSI/GSD.[61] Behind the terms used, several elements could be included in definitions and the ABS system.[62] Therefore, the choice between DSI and GSD is crucial as these terms do not encompass the same data. Indeed, the scope of GSD is narrower than that of DSI, as DSI could involve metabolomic or even phenotypic data.[63]

In this context, state submissions to the CBD and ITPGRFA analyzed pay special attention to the use of terms for DSI/GSD. The question of terminology is thus crucial. We believe that term choice will require both technical insight and will legally influence the scope of ABS mechanism. In Table 1, we present the parties' proposals to the CBD regarding term usage and compare them with the inclusion or exclusion of DSI in the definition of "biological material" and the ABS system. In their submissions to COP15 at the CBD, there are major divergences in the claimed terms.

Several contracting parties (including Brazil, Canada, Ethiopia, the European Union and its member states, Japan, the Republic of South Korea, South Africa, Switzerland) and observers (the United States) insisted on using the concept of GSD instead of DSI. According to their arguments, this concept is more scientifically precise and is the term most frequently used by the scientific community.[64]

Table 1: Position for COP15 on DSI terms

States	*Terminology*	*Justification*	*DSI and "genetic material"?*	*DSI and ABS?*
Argentina	GI	scientifically correct; broader scope of application	Yes	Yes

60 <https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-09-en.pdf>.

61 FAO, 'Report of the Tenth Session of the Governing Body' (2023) U.N. Doc. IT/GB-10/23/Report <https://www.fao.org/3/no194en/no194en.pdf>.

62 Wynberg and others (n 14) 2; Bagley (n 9) 6.

63 AHTEG, 'Report of the Ad Hoc Technical Expert Group on Digital Sequence Information on Genetic Resources' (CBD 2020) U.N. Doc. CBD/DSI/AHTEG/2020/1/7 <https://www.cbd.int/meetings/DSI-AHTEG-2020-01>; Aubry and others (n 14) 6.

64 Republic of South Korea; Japan; European Union and its member states; CBD, 2020, CBD/DSI/AHTEG/2020/1/INF/1. For previous data: Kobayashi, Domon and Watanabe (n 29) 5.

Conflicting Scientific Narratives at the Convention on Biological Diversity and Other Fora: Analysis and Contradiction in the Discussions on Dematerialization of (Plant) Genetic Resources

States	*Terminology*	*Justification*	*DSI and "genetic material"?*	*DSI and ABS?*
Australia	GSD; In silico	Inconsistencies in the terminology used (GSD/DSI/in silico)	No	No
Belarus	DSI (default)	No clear discussion on terminology; the Republic of Belarus should participate in the discussion on the definition of DSI.	/	Can be complex; commercialization may trigger benefit-sharing
Brazil	GI on genetic resource	Consistency with PIP framework; national legislation links GR to its GI	Yes	Yes
Canada	GSD; G*SD	DSI not used by the scientific community; Coherence with the PIP Framework; science-based approach; GSD/G*SD would be better from a science operation viewpoint	No	No
Colombia	DSI	broader scope	Yes	Yes
Costa-Rica	DSI	ATHEG recommendations; broader scope	Yes	Yes
Ethiopia	GI; GSD	The term DSI is not appropriate to capture the various information on GR	Yes	Yes
EU and its member states	GSD; NSD; GS	Importance of a "science-based" approach (ATHEG); DSI as a generic term; definition must be scientifically correct;	No	No; Open access
India	SI; SD	Broader scope; DSI is not appropriate for the different kinds of information on GR	under the utilization of GR	Yes
Iran	/	Scope on SI on GR; science-based process (AHTEG)	Yes	Yes, for commercial use
Japan	GSD	The term GSD is most appropriate; Coherence with the PIP Framework; term used by the scientific community	No	No

States	*Terminology*	*Justification*	*DSI and "genetic material"?*	*DSI and ABS?*
Madagascar	/	/	yes	Yes
Mexico	/	DSI not the most appropriate term but may be used as a placeholder term; discussion on the scope	DSI could render CBD obsolete	Yes
Republic of Korea	GSD	DSI not used by the scientific community; GSD more used and appropriate	No	No; Open access
South Africa	GI; NI; GSD; DSD	DSI not the most appropriate term but may be used as a placeholder term; Definition should refer to the genes (scope)	Yes	Yes
Switzerland	GSD	Concept must be clarified	No	No; could address MAT
United States of America	GSD	Narrow scope: definition must distinguish GSD from physical GR	No	No
African Union Commission on behalf of the African Group	GI; NI	DSI not appropriate; focus on the scope	Yes	Yes

Terminology: DSD = Digital Sequence Data; DSI = Digital Sequence Information; GI = Genetic Information; GR = Genetic Resource; GS = Genetic Sequence; GSD = Genetic Sequence Data; G*SD = Genomic Sequence Data; NI = Natural Information; SI = Sequence Information; MAT = Mutually Agreed Term

In justifications, scientific narratives and science-based policies are widely used but are not entirely neutral, as the chosen term conditions the scope and type of material covered. This point is acknowledged by the European Union (EU) and denounced by the African Union Commission (AUC) in their respective statements:

> For the European Union: "*As pointed out in the Fact-finding study on DSI (CBD/DSI/AHTEG/2018/1/3), differences in scientific terminology reflect differences in the material referred to*" (EU, COP15).
>
> For the African Union Commission: "*Our view is that a prolonged focus on terminology is not helpful for obtaining clarity on the concept of 'DSI'. The goal of a focus on terminology is to narrow the scope of applicability of*

> *the Nagoya Protocol, and have certain subject matter excluded from it*" (AUC, COP15).

Taking a critical approach, we find a connection between the advanced definitions (using GSD rather than DSI) and the positions advocated for the integration of DSI into "biological material" and ABS rules. This objective is reiterated by the United States, which wants to ensure that the definition of DSI distinguishes between DSI/GSD and "genetic material":

> "*GSD are neither genetic material nor a genetic resource. It is essential to maintain a conceptual and definitional distinction between genetic material itself and data associated with that material*" (United States, COP15).
>
> Conversely, South Africa wishes the definition to explicitly link DSI with genetic material, advocating for: "*work on a definition that explicitly make reference to the genes or genetic material which constitute a genetic resource*" (South Africa, COP15).

Finally, by studying state contributions to the CBD, we can draw the following preliminary conclusions: Firstly, we can identify similar discursive patterns in which the discourse favouring a "science-based policy" is used to reinforce a position suitable for member states. Secondly, the terms used and claimed will influence the scope and content that parties want to include in the definition, but they are also linked to positions defended by connecting DSI to "biological material" and the ABS regime. Still, some parties have clearly emphasized the political/legal consequences of term choices, although this is not systematic.

4.2 Relationship between Digital Sequence Information (DSI), "genetic material," and the ABS System

The second part of our discourse analysis will focus on the position of states regarding "genetic material" and the ABS system for CBD, the ITPGRFA and the PIP Framework. Firstly, the question of including DSI in the definition of "genetic material" is crucial, as the ABS regime depends on it.[65] This could explain the divergences in the use of scientific terms (such as "genetic sequence data," "natural information") as they already raise legal questions.[66]

A. Integration of DSI in the CBD and the ITPGRFA

To introduce our comparative analysis, we will briefly review the topics of negotiation regarding the inclusion of DSI in the Genetic resource and ABS system, although other analyses will go into more detail and negotiation history.[67] From a legal point of view, Article 2 of the CBD defines genetic resources as "the actual or potential value of genetic material." Genetic material is defined as "any material of plant, animal, microbial, or other origin containing functional units of heredity." Debates have arisen

[65] Wynberg and others (n 14) 5; Aubry and others (n 14) 6; Bond and Scott (n 12) 27; Lawson and Rourke (n 35) 3; Bendimred and Frison (n 13) 404.
[66] Bagley (n 9); Bond and Scott (n 12) 27; Hampton (n 7); Frison (n 2) 83.
[67] Aubry (n 11); Bagley (n 9); Lawson, Humphries and Rourke (n 16).

over the interpretation of the term "material" and whether it includes intangible resources.[68] Following the Nagoya Protocol, the ABS regime is triggered through "the use of genetic resources," involving "research and development activities on the genetic and/or biochemical composition of genetic resources, including the application of biotechnology as defined in Article 2 of the Convention.[69]

In anticipation of COP15, Bagley had identified three concurrent legal interpretations to address DSI. The first considers that DSI is not included in "genetic material" but could potentially result from its use and thus be addressed under MAT. Beyond MAT, DSI would be a form of non-monetary benefit-sharing, and thus no other compensations should be provided.[70] This position is generally shared by economic actors and northern countries arguing against linking ABS rules to DSI.[71] The second interpretation considers that DSI should be included in the definition of "genetic material," implying MAT and PIC.[72] We align with part of the literature considering that the definition of "genetic material" is already broad enough to include DSI,[73] and this would be a logical and good-faith interpretation of treaties, in accordance with the objectives of the Vienna Convention on the Law of Treaties.[74] Although the ABS regime risks becoming obsolete if it does not cover DSI[75], it will have to be adapted to DSI in any case, and this approach lacked support during negotiations.[76] The last interpretation includes DSI in the use of genetic resources, and the outcome of its use would be subject to MAT.[77]

As introduced earlier, states adopt opposing interpretations within the CBD and the ITPGRFA.[78] Indeed, Global North countries consider that DSI is not genetic resources and that treaties should be renegotiated to include them (Australia's position, followed notably by Canada, the European Union, Japan, South Korea, the United States, and Switzerland) (COP15).[79] For example, Canada asserts that the ABS system only applies to genetic material exclusively, and the term material does not include intangible information like DSI (COP13, COP 15).[80] For Australia, DSI does not fit the definitions of genetic material or its uses, and ABS rules cannot be applied without renegotiating the system (COP15).[81] These countries also assert that

68 Bagley (n 9) 29; Bendimred and Frison (n 13) 404.
69 Bagley (n 9) 29; Lyal (n 39) 591.
70 Bagley (n 9) 20; Hampton (n 7) 14.
71 Hampton (n 7) 15; Lawson and Rourke (n 35) 2.
72 Bagley (n 9) 34; Hampton (n 7) 15.
73 For other, it implies negotiations; Lawson and Rourke (n 35) 5; Bagley (n 9) 34.
74 Frison (n 2) 85.
75 Bond and Scott (n 12) 25; Aubry and others (n 14) 6; Bagley (n 9) 20.
76 Bagley (n 9) 34; Hampton (n 7) 15.
77 Bagley (n 9) 34; Hampton (n 7) 15; Lawson and Rourke (n 35) 7.
78 Hampton (n 7) 15; Lawson and Rourke (n 35) 1.
79 Lawson and Rourke (n 35) 8.
80 Bond and Scott (n 12) 27; Bendimred and Frison (n 13) 419.
81 Lawson and Rourke (n 35) 8.

regulating DSI will limit scientific progress, and making DSI available online would be a form of non-monetary benefit-sharing (COP15).

Conversely, several Global South countries believe that the use of DSI falls under ABS rules, and some have adapted their national rules accordingly (COP14, COP15).[82] Namibia had indicated that the use of genetic sequences would significantly impact the CBD (COP13).[83] Indonesia, Brazil, and the Democratic Republic of the Congo had also emphasized the applicability of national sovereignty over DSI (COP13, COP15).[84] Recently, Brazil and Argentina reiterated the ambiguity of the term material, which does not necessarily imply tangibility in its definitions in the dictionary (COP15).[85]

B. Integration of GSD into the PIP Framework

Discussions differ in the case of the Pandemic Influenza Preparedness (PIP) because there is already a definition of "biological material" (PIP, Art. 4.1) that is distinct from Genetic Sequence Data (GSD) (PIP, Art. 5).[86]

> GSD refers to "the order of nucleotides found in a molecule of DNA or RNA. They contain the genetic information that determines the biological characteristics of an organism or a virus s" (PIP, Art. 4.2).[87]

However, the PIP only briefly addresses GSD, requesting that "analyses resulting from this data" be "shared rapidly, in a timely and systematic manner"" (PIP, Art. 5.2.1) with GISAID, Genebank, or comparable databases (PIP, Art. 5.2.2 and Annexes 4 ([9]) and 5 ([9])).[88] For some, GSD was not sufficiently anticipated during the development of the PIP. There was also a contrast between the PIP rules on physical viruses and scientific practice (using DSI), which operates outside the PIP Framework. Therefore, the PIP underwent renegotiations in 2016, especially regarding the applicability of ABS system.[89] This process was initiated by the PIP Framework Advisory Group and assisted by a Technical Expert Working Group on GSD (TEWG). The TEWG proposed amending the definition of "biological material" to include GSD, integrating them into the ABS system with a monitoring mechanism.[90]

To follow up on World Health Assembly (WHA) decision WHA70(10) in May 2017, states and civil parties were invited to present their positions.

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82 ibid 2. Bond and Scott (n 12) 9; Lawson, Humphries and Rourke (n 41) 133.
83 Bond and Scott (n 12).
84 Ibid.
85 Bendimred and Frison (n 13); Bond and Scott (n 12); Lawson and Rourke (n 35).
86 Lawson, Humphries and Rourke (n 16) 8; Lawson and Rourke (n 35) 5.
87 Lawson, Humphries and Rourke (n 16) 8.
88 Halabi and Katz (n 39) 196; Lawson, Humphries and Rourke (n 16) 9.
89 Halabi and Katz (n 39) 195.
90 PIP Framework Review Group, 'Report of the 2016 PIP Framework Review Group' (2016) U.N. Doc. A70/17/EB140/16 <https://apps.who.int/gb/ebwha/pdf_files/EB140/B140_16-en.pdf>, 53-54; Lawson, Humphries and Rourke (n 16) 16; Michelle Rourke and Mark Eccleston-Turner, 'The Pandemic Influenza Preparedness Framework as a "Specialized International Access and Benefit-Sharing Instrument" under the Nagoya Protocol' (2021) 72 Northern Ireland Legal Quarterly 411, 422.

Despite extended discussions (WHA71(11), WHA72(12), and WHA72(13)), no concrete proposals were accepted to minimize the impact of GSD on the PIP Framework.[91] Ultimately, although discussions for the PIP did not lead to specific agreements, it provided an opportunity for states to share their positions and narratives on a similar topic. It is interesting to note that contradictory positions were defended by the same states in negotiations on GSD within the PIP and on DSI within the CBD and ITPGRFA (Table 2). Indeed, states that submitted comments for all three organizations showed relatively supportive positions for GSD within the PIP, while they held much closed positions for DSI within the CBD and the ITPGRFA.

Table 2: Compilation of comments on DSI regarding the relationship with the definition of biological material

State	*ITPGRFA*	*CBD*	*PIP Framework*
Australia	Open access to DSI is as form of ABS. DSI should be open access. Should not intervene in scientific progress.	Does not support the inclusion of DSI in ABS regime. DSI should be Open access for scientific innovation.	Welcome GSD management under the PIP framework, with ABS mechanism. GSD should be managed under the PIP framework as not circumvent Benefit sharing.
Germany (and EU for the CBD)	DSI should be open access. Open access to DSI is as form of ABS. Open access as a form of ABS. Importance of DSI for scientific progress	DSI should be open access. Open access to DSI is as form of ABS. Importance of DSI for scientific progress, human health, and environment.	GSD should be included in the ABS of the PIP Framework.
United States of America	Open access to DSI is as form of ABS.DSI should be open access. Should not intervene in scientific progress.	Importance of GSD for scientific research. Sharing of GSD is a form of benefit sharing. Sharing of GSD should not be restricted.	Access to GSD should trigger different types of benefits. *Example*: development of sensitive virus detection methods and the generation of candidate vaccine virus
Third Word network	Refers to the discussion under the CBD.	ABS rules should be same/similar for DSI and biological material. ABS for DSI should be structured such that obligations are triggered based on types of use, without regard for the identity of the	Should be handled with ABS, if not, it is not coherent with the Framework

[91] Rourke and Eccleston-Turner (n 90) 440.

State	*ITPGRFA*	*CBD*	*PIP Framework*
		user, be it a company, a non-profit, an academic, or other entity.	

This table reveals divergent positions on similar subjects: DSI/GSD. In this case, these countries believe that GSD should be covered by ABS mechanism for the PIP, while DSI should not be for the ITPGRFA and the CBD. While they were strict about DSI not being covered by the CBD and the ITPGRFA, these states consider that the objectives of the PIP should apply to GSD, given its goals. Australia expressed concerns about the negotiation difficulties related to including GSD in the PIP's definition of biological material and proposed working on their integration into an annex. The United States ordered additional studies on the differences between GSD and PIP biological material.

Even clearer, the following table compares the positions of the same states on the inclusion of DSI/GSD in the ABS system. Positions are contradictory. In the CBD and the ITPGRFA, ABS is considered a hindrance to progress and scientific practice, as it would limit access to dematerialized genetic resources. However, compared states have different positions for the PIP Framework, where they consider it logical to include DSI/GSD in the ABS system.

Table 3: Compilation of comments on DSI/GSD regarding ABS

State	*ITPGRFA*	*CBD*	*PIP Framework*
Australia	DSI is not a physical material and not a genetic resource under the ITPGRFA	DSI is not a physical material and not a genetic resource under the CBD. DSI is not a derivative under the NP. Changing the definition would require renegotiation of the CBD/NP	GSD should be handled under the PIP Framework (…) to ensure consistency with the principles of Sharing other PIP material. Changing the definition of PIP biological material would require significant amendments and likely complex and timely negotiations. Prefer developing an Annex for Article 6 to include GSD
Germany (and EU for the CBD)	DSI is not a physical material and not a genetic resource under the ITPGRFA.	DSI is not a physical material and not a genetic resource under the CBD/nor a derivative under the NP.	GSD should be handled under the PIP Framework. PIP Framework's objective does apply for GSD.

State	*ITPGRFA*	*CBD*	*PIP Framework*
United States of America	DSI is not a physical material and not a genetic resource under the ITPGRFA	DSI is not a physical material and not a genetic resource under the CBD.	GSD should be handled by the PIP Framework Future discussion would benefit from the difference between GSD and biological material. Stresse the importance of a complete understanding of GSD
Third Word network	GSD is a challenge for ABS and the objectives of the treaty. Refer to the CBD negotiation. Argues for accessibility with user agreement/ rules instead of open access	DSI will challenge ABS rules that are not adapted for it. Open source and public domain as a loophole for ABS. Argues for accessibility with user agreement/rules instead of open access	Users of GSD should be subject to a PIP Data Access Agreement implementing the Framework's benefit sharing provisions.

By linking these two tables, we can observe obvious contradictions in these states' positions on these similar subjects. DSI is declared outside the scope of the CBD and the ITPGRFA and their definitions of "biological material." However, these states did not express this type of difficulty in including GSD in the PIP. The same contradiction can be found in statements regarding the ABS system. Benefit-sharing is rejected for the ITPGRFA and the CBD, especially not to hinder scientific progress, and that open access to DSI would be a form of non-monetary benefit-sharing. However, for the PIP Framework, the same states argued for the inclusion of GSD in the ABS system (expressing concerns about system erosion).

When studying the scientific narratives used, arguments in favour of open access to DSI to avoid hindering scientific progress can be found. For the CBD, various stakeholders' arguments (Canada, the United States, Germany, Japan) state that DSI will be essential to advancing science, benefiting humanity as a whole (COP15).[92] Following this argument, DSI should not be regulated to hinder scientific progress. In this regard, Global North countries advocate maintaining DSI as open access to advance science globally.[93] Furthermore, for some, open access already constitutes a form of ABS (declaration from the United States, Canada),[94] asserting that northern countries are DSI providers or, at the very least, keep their databases open to

[92] Sherkow and others (n 3) 5; Wynberg and others (n 14) 2.

[93] Amber Hartman Scholz and others, 'Multilateral Benefit-Sharing from Digital Sequence Information Will Support Both Science and Biodiversity Conservation' (2022) 13 Nature Communications 1086, 1.

[94] Aubry and others (n 14) 9.

all.[95] These positions taken in the CBD contradict those in the PIP, where access to GSD should trigger the obligation of benefit-sharing (United States). Additionally, presenting DSI as a non-monetary benefit shows a semantic shift that completely bypasses the issue of access (PIC and MAT) to these resources, and seems unconvincing given that all countries do not have the same technical capacity to produce and benefit from scientific results arising from DSI.[96]

5. DISCUSSION: THE EPISTOCRATIC USE OF SCIENCE IN DSI

As these analyses and tables show, there is an epistocratic use of scientific arguments. In using scientific narratives, contracting parties tend to defend their positions as supposedly neutral and objective viewpoints on DSI, while avoiding any political discussions on the matter.[97] In their position papers, the contracting parties use scientific narrative to consolidate their approaches or present them as rational and objective.[98] For example, this appeal to science and scientific rhetoric can be found in various state positions: "*Belgium emphasizes the importance of adopting a science-based approach when exploring a possible common understanding of the scope, definition and concept of DSI*" (Belgium GB8); "*The Scoping study commissioned by CGRFA, for example, explains that 'genetic information' or 'genomic information' is more common in scientific literature, whereas 'DSI' is not commonly used*" (Germany GB8); "*Genetic sequence data by definition do not contain 'functional units of heredity' like DNA so, they are not genetic resources nor genetic material*" (Italy GB8).

Contrary to objectivist positions of science, it is essential to place scientific narratives in their social contexts and power relations. In this case, we want to situate this epistocratic and narrative use of science within the "great divide" described by Stengers, Latour, and Escobar, which separates natural sciences (responsible for understanding nature) and politics (regulating social life).[99] However, this nature/politics dichotomy is now criticized and challenged by a proliferation of hybrid problems, linking technical issues, their uncertainties, and their significant social implications.[100] Criticizing the idea of neutral and objective science, Foucault

95 Aubry (n 11) 9.
96 Aubry and others (n 14) 9.
97 Latour, *We Have Never Been Modern* (n 26); Latour, *Politics of Nature* (n 20); Viala (n 1) 17.
98 Sarah Whatmore, *Hybrid Geographies: Natures, Cultures, Spaces* (SAGE 2002) 98; Stuart Coupe, Roger Lewins, *Negotiating the Seed Treaty* (Practical Action Publishing 2007) 39.
99 Latour, *Politics of Nature* (n 20); Bruno Latour, *Facing Gaia: Eight Lectures on the New Climatic Regime* (Polity Press 2017); Isabelle Stengers, *Another Science Is Possible. A Manifesto for Slow Science* (Polity, 2018); Arturo Escobar, *Sentir-penser avec la Terre. L'écologie au-delà de l'Occident* (Seuil 2018).
100 Latour, *Politics of Nature* (n 20) 98; Stengers, *Another Science Is Possible* (n 99) 221; Delphine Gardey, 'Donna Haraway : Poétique et Politique Du Vivant' (2013) 55 Cahiers du Genre 171; Sheila Jasanoff, 'The Floating Ampersand: STS Past and STS to Come' (2016) 2 Engaging Science, Technology, and Society 227.

and Haraway point out the normative temptations of knowledge-power and the blending of descriptive and prescriptive elements.[101] Furthermore, different social approaches to science reinvest social connections and influences in the knowledge creation process, advocating for a situated knowledge.[102]

In connection, the dichotomy between science and politics is criticized by the ontological and decolonial turn in the philosophy of science.[103] In this direction, Whitt denounces a double instrumentalization of science, which she labels as bioimperialism. On one hand, science can be rhetorically used to impose a dominant narrative (presenting itself as the result of objectivity and universality).[104] On the other hand, science is used to disqualify traditional knowledge to exploit it freely: only once this raw knowledge is translated into innovation and invention, it becomes valuable.[105] Additionally, in biodiversity negotiations, the scientific method is sometimes confused with the concept of technological innovation, obscuring the profit and inequality system resulting from the use of these innovations.[106]

Social and decolonial approaches to science can be used as interpretive keys to analyze science in international negotiations on DSI. The same epistocratic and bioimperialistic tendencies are found, as well as the monopoly of Western knowledge and valuable sciences.[107] In this hybrid context where interests diverge, science related to DSI, and its use is not an innocent and neutral academic activity.[108] For example, and reproducing forms of biocolonialism, wealthy countries tend to maintain a scientific narrative only if it aligns with their political and economic interests.[109]

It is important to remember that scientific narratives on DSI are not neutral, objective, and extra-social but are closely tied to socio-political contexts and should be received with precaution.[110] Nevertheless, the history of DSI negotiations is characterized by a desire to develop a science-based policy.[111] In this context, the CBD, for example, commissioned several studies on the current state of DSI (concept, scope, and current use), their traceability,

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101 Michel Foucault, *Théories et institutions pénales. Cours au Collège de France* (Le Seuil 2015); Donna Haraway, *Simians, Cyborgs, and Women* (Routledge 2013).

102 Gardey (n 96) 171; Haraway (n 101).

103 Mario Blaser, 'Ontological Conflicts and the Stories of Peoples in Spite of Europe: Toward a Conversation on Political Ontology' (2013) 54 Current Anthropology 547; Escobar (n 99).

104 Whitt (n 46) 17; Viala (n 1) 169.

105 Lawson, Humphries and Rourke (n 41) 115; Madhavi Sunder, 'The Invention of Traditional Knowledge' (2007) 70 Law and Contemporary Problems 97; Whitt (n 46) 17, 157.

106 Bond and Scott (n 12) 25.

107 Lawson, Humphries and Rourke (n 41) 129; Whitt (n 46) 17.

108 Donald F Boesch, 'The Role of Science in Ocean Governance' (1999) 31 Ecological Economics 189; Aubry (n 11) 6; Lawrence S Finkelstein, 'What Is Global Governance?' (1995) 1 Global Governance 367, 369; Bond and Scott (n 12) 25.

109 Lawson, Humphries and Rourke (n 41) 132.

110 Ibid 116; Linda Tuhiwai Smith, *Decolonizing Methodologies: Research and Indigenous Peoples* (Zed Books 2012) 5; Aubry and others (n 14) 6.

111 Lawson, Humphries and Rourke (n 16); Bagley (n 9) 29.

their use in public and private databases, and national measures.[112] These studies also considered several policies scenarios to adapt ABS rules to DSI.[113] As detailed before, a study conducted for the CBD proposed four ranks to classify information contained in DSI: DNA and RNA; protein sequences; resulting metabolites; associated knowledge, including traditional knowledge.[114] On this point, Oguamanam emphasizes that this choice is more inclusive, as traditional knowledge associated was not included in the scope of DSI in previous studies.[115]

These studies are widely adopted in the political negotiations of DSI, sometimes lacking critical distance on the problematization process itself: can these studies be limited to purely scientific questions? Or is the scope itself not a legal question? Thus, the formulation of questions will inevitably lead to certain conclusions.[116] Moreover, the choice of study subjects commissioned is crucial as it will create specific knowledge that will guide future negotiations.[117] Furthermore, the scientific approach has been used as a disqualifying factor in recent negotiations: national delegates expressed discomfort and positioned themselves as scientific or non-scientific, some positions were rejected as "non-scientific," and other positions emphasized the need to develop legislation based on science.[118] Quite pragmatically, scientific communities and their representatives argue in favor of open access for DSI given their importance for scientific practice. In this rhetorical configuration, science is seen as a value and a common goal of humankind, which implies that DSI regulation will limit scientific progress.[119] However, open access is not considered fair, as actors from the North and the South do not have the same capacity to produce and benefit from DSI and its scientific results.[120]

Finally, the use of science in negotiations also favours a certain dualistic and reductionist worldview found in the Western scientific framework.[121] According to us, problematizing the question of DSI through this scientific prism leads to dissociating physical and immaterial genetic resources. However, other equally legitimate epistemic regimes will holistically integrate physical and intangible elements of genetic resources. As

112 Bagley (n 9) 26.
113 Ibid 27.
114 Wynberg and others (n 14) 2; Bagley (n 9) 6; Oguamanam (n 59) 371.
115 Oguamanam (n 59) 371.
116 Bond and Scott (n 12) 25.
117 Ibid 29.
118 Ibid.
119 David J Jefferson, 'Dematerialization and Intellectual Property in the Biosciences' in Erick Valdés and Juan Alberto Lecaros (eds), *Handbook of Bioethical Decisions. Volume II: Scientific Integrity and Institutional Ethics* (Springer International Publishing 2023) 173; Smyth and others (n 24); Michelle Rourke, 'Access and Benefit-Sharing DNA Componentry for Plant Synthetic Biology: Bioparts Expressed in Plant Chassis' (2021) 4 Plants People Planet 76.
120 Aubry and others (n 14) 5; Sabina Leonelli, 'Data Interpretation in the Digital Age' (2014) 22 Perspectives on Science 397 <https://doi.org/10.1162/POSC_a_00140>.
121 Philippe Descola, *Par-delà nature et culture* (Gallimard 2005); Latour, *Politics of Nature* (n 20); Lawson, Humphries and Rourke (n 41) 11.

Oguamanam points out, traditional knowledge, which adopts a more holistic approach to DSI, is relegated to the periphery of genuinely scientific approaches.[122] As he denounces, these studies and negotiations on DSI guided by the narrow Western view of science are limited to molecular and Cartesian approaches to phenomena.[123] In this way, science offers a powerful discourse to delimit reality and frame the margins of political manoeuvring, and the omnipresence of Western scientific perspectives on DSI is used to delegitimize and weaken traditional knowledge and its stakeholders in these debates, further reinforcing epistemic colonization.[124]

6. CONCLUSION

The aim of this article was to explore the use of scientific arguments in international DSI negotiations, and to denounce any epistocratic or strategic use of science (RO1, RO2). There are two RQs: How do States mobilize scientific arguments in DSI negotiations under the CBD, ITPGRFA and PIP (RQ1)? Are there any strategic, even epistocratic, uses of scientific arguments in these debates to support political or legal positions (RQ2)? The hypothesis was that certain states use scientific narratives to justify decisions and interpretations favourable to their interests (H1); bearing in mind that certain actors (Global North countries, industry, some academics) have a vested interest in the liberalization of DSI and argue for a restrictive interpretation of ABS regime (H2).

The author started by presenting the Regime Complex of (plant)genetic resources, the issue of DSI, and a critical position on the epistocratic use of scientific arguments. DSI are a complex and "hybrid" issue: the growing importance of DSI sequencing and exchange is occurring independently of ABS instruments; DSI risks making any ABS system obsolete; contracting parties have different interests, uses and benefits regarding DSI; DSI are a technical subject, where scientific narratives can be used to understand, argue, and depoliticize these issues.[125] This article shows that scientific arguments can be used in an epistocratic way, in that it would justify a (subjective) political option by hiding behind a supposedly objective/technical argument (RQ1, RQ2).[126] In a transversal way, we have seen that parties tend to rely on scientific narrative to consolidate their positions. However, this scientific narrative is more assertive than precisely explained and based on concrete scientific references[127]. With our case studies, contradictory positions and arguments have been observed, even though the contracting parties claim to be following a science-policy process.

[122] Oguamanam (n 59) 371.
[123] ibid.
[124] ibid 17.
[125] Hampton (7) 9.
[126] Latour, *Politics of Nature* (n 20); Viala (n 1) 17.
[127] Lyal (n 39) 608.

In a subsidiary way, we had seen other rhetorical uses of science: as a disqualifying element or as a value and common objective (RQ1). Indeed, we highlighted a Western-centric approach to science, which consolidates a reductionist approach to genetic resources and disqualifies traditional knowledge. In addition, we can also see states positions that use science as a value argument or a common goal. Some parties (Canada, USA, Germany, Japan – GB8; COP15) insisted that DSI are essential for the advancement of science, which is essential for the common progress of humankind (H2). This argument leads to a plea for open access to DSI and a restriction of ABS measures, seen as an administrative burden that would be to the detriment of science.[128]

The author then undertook an analysis of state positions and narratives on DSI within the CBD, the ITPGRFA, and the PIP. An initial analysis of positions was undertaken, focusing on recent submissions on the use of the term at the CBD by contracting parties and stakeholders (before the COP15 and its new agreement). We compared the use of terms, negotiated scope, and state positions on the subjects of "genetic material" and ABS system. In line with our hypotheses, we found that several parties claimed to adopt a "science-based" position as a legitimacy factor (RO1-2, RQ1-2, H1). However, the use of these scientific narratives seems in line with state interests, especially concerning their preferences for GSD in defining DSI. Some contributions both assumed and denounced the issues related to these terms (United States, South Africa, EU and its member states, African Union Commission). In that sense, the use of scientific argument is neither neutral nor without consequence, as the term will influence the selected and framed materials (RO1-2, RQ1-2, H1).

A second discourse analysis focused on positions regarding the inclusion of DSI in the definitions of genetic resource and genetic material, and the inclusion of DSI in ABS systems. Again, the same States/stakeholders argue for different positions, although they always claim to rely on scientific arguments (for example, claiming that DSI are not "scientifically" a genetic material) and on arguments favoring the development of science (arguing for open access to DSI). By focusing on state positions on "genetic material" and ABS, opposing positions were observed from Australia, Germany, and the United States (the three states that submitted their positions for all three instances). While these states affirm that DSI is not "genetic material" in the sense of the CBD and the ITPGRFA and does not fall under the scope of ABS, these same states argue that GSD should fall under the PIP and its ABS system. This shows a clear inconsistency despite the use of so-called science-based policy process (RO1-2, RQ1-2, H1).

There are limitations to these studies, which will be addressed in future research. Firstly, this discourse analysis focused on three instruments

[128] Sherkow and others (n 3) 5; Aubry and others (n 14) 5.

(ITPGRFA, CBD, PIP), whereas the issue of DSI extends to other instruments (WIPO, BBNJ, WHO - Pandemic Treaty). A more systematic analysis of the various fora will be undertaken, including the negotiations following the COP15 agreement. A second limitation concerns the number of states analyzed in our case studies (genetic material and ABS). The method adopted for these cases consisted in comparing the written statement by the states/stakeholders in three instances (ITPGRFA, CBD, PIP), which limited us to Australia, Germany (EU for the CBD), the USA (observer at the CBD), and the Third World Network. Our future research will be based on a broader methodology (interviews, participant observation) to analyze the scientific arguments of a larger number of parties, including Global South states/stakeholders. Thirdly, this article has mainly identified the use of science as an epistocratic argument, but other rhetorical uses of science may be explored in future research: the Western-centric definition of science as disqualifier of other epistemic propositions (traditional knowledge); science as a value and a common goal, etc.

The aim of this article is to provide a more detailed analysis of the use of scientific elements, narratives and arguments in DSI negotiations. Indirectly, it also raises broader questions about the use of scientific argumentation in politics and law (RO1-2). Analysis of epistocratic uses shows that science can be used as a depoliticizing tool to justify a political position, while adhering to a narrative of objectivity or neutrality. It is certainly not uncommon in these international negotiations to see opposing discourses, or even epistocratic uses of science.[129] However, these contradictions tarnish the credibility of arguments, especially when they are based on scientific narratives. This article will undoubtedly conclude by inviting the parties to be more transparent about their political positions and intentions, to listen to the cosmopolitan positions of others, and not to try to justify or hierarchize everything since a supposedly neutral and objecting science to resolve all conflicts. To do so would be to misunderstand the roles and functions of science, law, and politics.

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REFERENCES

AHTEG, 'Report of the Ad Hoc Technical Expert Group on Digital Sequence Information on Genetic Resources' (CBD 2020) U.N. Doc.

[129] Aubry and others (n 14) 9; Latour, *Politics of Nature* (n 20).

CBD/DSI/AHTEG/2020/1/7 <https://www.cbd.int/meetings/DSI-AHTEG-2020-01>

Ambler, J. and others, 'Including Digital Sequence Data in the Nagoya Protocol Can Promote Data Sharing' (2021) 39 Trends in Biotechnology 116

Aubry, S., 'The Future of Digital Sequence Information for Plant Genetic Resources for Food and Agriculture' (2019) 10 Frontiers in Plant Science 1

Bagley, M. A., '"Just" Sharing: The Virtues of Digital Sequence Information Benefit-Sharing for the Common Good' (2022) 63 Harvard International Law Journal 1

Bendimred, A. and Frison, C., 'Séquençage des données issues des ressources génétiques : trouble-fête du régime international d'accès et de partage des avantages du Protocole de Nagoya' (2021) Annales de droit de Louvain (ADL) 2, 381

Blaser, M., 'Ontological Conflicts and the Stories of Peoples in Spite of Europe: Toward a Conversation on Political Ontology' (2013) 54 Current Anthropology 547

Boesch, D. F., 'The Role of Science in Ocean Governance' (1999) 31 Ecological Economics 189

Bond, M. R. and Scott, D., 'Digital Biopiracy and the (DSI) Assembling of the Nagoya Protocol' (2020) 117 Geoforum 24

CBD, 'Compilation of views and information on digital sequence information on genetic resources submitted pursuant to paragraphs 9 and 10 of decision 14/20' (2020) U.N. Doc. CBD/DSI/AHTEG/2020/1/INF/1. <https://www.cbd.int/doc/c/abcf/b9df/be9859f376997cf8cc00d175/dsi-ahteg-2020-01-inf-01-en.pdf>

Champeil-Desplats, V., *Méthodologies du droit et des sciences du droit* (Dalloz 2022).

Corten, O., *Méthodologie du droit international public* (Université de Bruxelles 2017)

Coupe, S. & Lewins. R., *Negotiating the Seed Treaty* (Practical Action Publishing 2007)

de Vries, G., *Bruno Latour* (Polity Press 2016)

Descola, P., *Par-delà nature et culture* (Gallimard 2005)

Dovers, S. R., Norton, T. W. and Handmer, J. W., 'Uncertainty, Ecology, Sustainability and Policy' (1996) 5 Biodiversity & Conservation 1143

Dunlop, C. A., 'The Possible Experts: How Epistemic Communities Negotiate Barriers to Knowledge Use in Ecosystems Services Policy' (2014) 32 Environment and Planning C: Government and Policy 208

Escobar, A., *Sentir-penser avec la Terre. L'écologie au-delà de l'Occident* (Seuil 2018)

Filardi, M. and Eand Prato, S., 'La Remise En Question de La Dématérialisation Des Systèmes Alimentaires, Condition Sine qua Non Pour Reprendre En Main Le Futur de l'alimentation' in L'observatoire

pour le droit à l'alimentation et à la nutrition, *Dématérialisation de l'alimentation : aborder de front les défis de l'ère numérique* (2018)

FAO, 'Report of the Tenth Session of the Governing Body' (2023) U.N. Doc. IT/GB-10/23/Report <https://www.fao.org/3/no194en/no194en.pdf>

Favre, J., 'Épistocratie et droit global' in Alexandre Viala, *Demain, l'épistocratie?* (Mare & Martin 2022)

Finkelstein, L. S., 'What Is Global Governance?' (1995) 1 Global Governance 367

Foucault M, *Théories et institutions pénales. Cours au Collège de France* (Le Seuil 2015)

Frison, C., *Redesigning the Global Seed Commons* (Reprint édition, Routledge 2018)

Gardey, D., 'Donna Haraway : Poétique et Politique Du Vivant' (2013) 55 Cahiers du Genre 171

Hajer Mand Versteeg, W., 'A Decade of Discourse Analysis of Environmental Politics: Achievements, Challenges, Perspectives' (2005) 7 Journal of Environmental Policy & Planning 175

Halabi, S. F. and Katz, R. (eds), *Viral Sovereignty and Technology Transfer: The Changing Global System for Sharing Pathogens for Public Health Research* (Cambridge University Press 2020)

Hampton, A. R., 'Pathogen Dematerialization and the ABS Loophole' (2023) 10 Journal of Law and the Biosciences 1

Haraway, D., *Simians, Cyborgs, and Women* (Routledge 2013)

Houssen, W., Sara, R. and Jaspars, M., 'Digital Sequence Information on Genetic Resources: Concept, Scope and Current Use' (2020) U.N. Doc. CBD/DSI/AHTEG/2020/1/3 <https://www.cbd.int/doc/c/fef9/2f90/70f037ccc5da885dfb293e88/dsi-ahteg-2020-01-03-en.pdf>

ITPGRFA, 'Compilation of information on "digital sequence information" with respect to plant genetic resources for food and agriculture' (2019) U.N. Doc. IT/GB-8/19/16.1/Inf.1. <https://www.fao.org/3/na770en/na770en.pdf>

ITPGRFA, 'Consideration of Digital Sequence Information in Accordance with Resolution 13/2019 and the Multi-Year Programme of Work' (2022) U.N. Doc. IT/GB-9/22/17.2 Rev.1. <https://www.fao.org/3/cc1508en/cc1508en.pdf>

Jasanoff, S., 'The Floating Ampersand: STS Past and STS to Come' (2016) 2 Engaging Science, Technology, and Society 227.

Jefferson, D. J., 'Dematerialization and Intellectual Property in the Biosciences' in Erick Valdés and Juan Alberto Lecaros (eds), *Handbook of Bioethical Decisions. Volume II: Scientific Integrity and Institutional Ethics* (Springer International Publishing 2023)

Kreiken, B. and Bas, A., 'Disruptive Data: How the Access and Benefit-Sharing Discourses from the Convention on Biological Diversity Structured Ideas and Decisions on Digital Sequence Information in the

Period 2016 – 2022' (2024) SSRN Scholarly Paper. Rochester, NY. <https://doi.org/10.2139/ssrn.4788655>

Kunihiko Kobayashi, Eiji Domon and Kazuo N Watanabe, 'Interaction of Scientific Knowledge and Implementation of the Multilateral Environment Agreements in Relation to Digital Sequence Information on Genetic Resources' (2020) 11 Frontiers in Genetics 1

Laird, S. and Wynberg, R., 'A Fact Finding and Scoping Study on Digital Sequence Information on Genetic Resources in the Context of the Convention on Biological Diversity and Nagoya Protocol' (2018), U.N. Doc. CBD/DSI/AHTEG/2018/1/3 <https://www.cbd.int/doc/c/b39f/4faf/7668900e8539215e7c7710fe/dsi-ahteg-2018-01-03-en.pdf>

Latour, B., *Facing Gaia: Eight Lectures on the New Climatic Regime* (Polity Press 2017)

Latour, B., *Politics of Nature: How to Bring the Sciences into Democracy* (Harvard University Press 2004)

Latour, B., *We have never been modern* (Harvard University Press 1993)

Lawson, C. and Rourke, M., 'Digital Sequence Information as a Marine Genetic Resource under the Proposed UNCLOS Legally Binding Instrument' (2020) 122 Marine Policy 103878

Lawson, C., Humphries, F. and Rourke, M., 'The Future of Information under the CBD, Nagoya Protocol, Plant Treaty, and PIP Framework' (2019) 22 The Journal of World Intellectual Property 103

Lawson, C. and Humphries Fand Rourke, M., *Access and Benefit Sharing of Genetic Resources, Information and Traditional Knowledge* (Routledge, 2022)

Leonelli, S., 'Data Interpretation in the Digital Age' (2014) 22 Perspectives on Science 397 <https://doi.org/10.1162/POSC_a_00140>

Lyal, C. H. C., 'Digital Sequence Information on Genetic Resources and the Convention on Biological Diversity' in Evanson Chege Kamau (ed), *Global Transformations in the Use of Biodiversity for Research and Development: Post Nagoya Protocol Implementation Amid Unresolved and Arising Issues* (Springer International Publishing 2022)

Neumann, D. and others, 'Global Biodiversity Research Tied up by Juridical Interpretations of Access and Benefit Sharing' (2017) 18 Organisms Diversity & Evolution 1

Oberthür, S. and Pożarowska, J., 'Managing Institutional Complexity and Fragmentation: The Nagoya Protocol and the Global Governance of Genetic Resources' (2013) 13 Global Environmental Politics 100

Oguamanam, C., 'Indigenous Peoples' Rights in Equitable Benefit-Sharing Over Genetic Resources: Digital Sequence Information (DSI) and a New Technological Landscape' in Dwight Newman, *Research Handbook on the International Law of Indigenous Rights* (Edward Elgar Publishing 2021) 354

PIP Framework Review Group, 'Report of the 2016 PIP Framework Review Group' (2016) U.N. Doc. A70/17/EB140/16 <https://apps.who.int/gb/ebwha/pdf_files/EB140/B140_16-en.pdf>

PIP Framework, 'Implementation of Decision WHA70(10) 8(b) - Compilation II. GSD Analysis, (2017) U.N. Doc. <https://cdn.who.int/media/docs/default-source/pip-framework/governance/analysis-of-seasonal-influenza-gsd-under-the-pip-framework/related-documents/gsdcompilation.pdf?sfvrsn=6b4945bf_6>

Rachel Wynberg and others, 'Farmers' Rights and Digital Sequence Information: Crisis or Opportunity to Reclaim Stewardship Over Agrobiodiversity?' (2021) 12 Frontiers in Plant Science 1

Raustiala, K. and G. Victor, D., 'The Regime Complex for Plant Genetic Resources' (2004) 58 International Organization 277

Rourke, M. and Eccleston-Turner, M., 'The Pandemic Influenza Preparedness Framework as a "Specialized International Access and Benefit-Sharing Instrument" under the Nagoya Protocol' (2021) 72 Northern Ireland Legal Quarterly 411

Rourke, M., 'Access and Benefit-Sharing DNA Componentry for Plant Synthetic Biology: Bioparts Expressed in Plant Chassis' (2021) 4 Plants People Planet 76

Scholz, A. H. and others, 'Multilateral Benefit-Sharing from Digital Sequence Information Will Support Both Science and Biodiversity Conservation' (2022) 13 Nature Communications 1086, 1

Shanahan, E. A., Jones, M. D. and McBeth, M. K., 'How to Conduct a Narrative Policy Framework Study' (2018) 55 The Social Science Journal 332

Sherkow, J. S. and others, 'Ethical, Legal, and Social Issues in the Earth BioGenome Project' (2022) 119 Proceedings of the National Academy of Sciences 1

Smith, L. T., *Decolonizing Methodologies: Research and Indigenous Peoples* (Zed Books 2012)

Smyth, S. J. and others, 'Implications of Biological Information Digitization: Access and Benefit Sharing of Plant Genetic Resources' (2020) 23 The Journal of World Intellectual Property 267

Stengers, I., *Another Science Is Possible. A Manifesto for Slow Science* (Polity, 2018)

Stengers, I., *Cosmopolitiques* (Empêcheurs de penser rond 2022)

Stephens, Z. D. and others, 'Big Data: Astronomical or Genomical?' (2015) 13 PLOS Biology e1002195

Sunder, M., 'The Invention of Traditional Knowledge' (2007) 70 Law and Contemporary Problems 97

Sylvain Aubry and others, 'Bringing Access and Benefit Sharing into the Digital Age' (2022) 4 Plants, People, Planet 5

Tallberg, J. and Zürn, M., 'The Legitimacy and Legitimation of International Organizations: Introduction and Framework' (2019) 14 The Review of International Organizations 581.

Tordjman, H., *La croissance verte contre la nature* (La découverte 2021)

Tschersich, J., 'Norm Conflicts as Governance Challenges for Seed Commons: Comparing Cases from Germany and the Philippines' (2021) 7 Earth System Governance 100097

Viala, A., *Demain, l'épistocratie ?* (Mare Martin 2022)

Walckiers, P., 'The use of scientific arguments as a mode of justification. What place does it have in politics and law? A case study of EU GMO regulation' (2023) De Europa 175 <http://hdl.handle.net/2078/272904>

Welch, E. and others, 'Potential Implications of New Synthetic Biology and Genomic Research Trajectories on the International Treaty for Plant Genetic Resources for Food and Agriculture' (2017) A study commissioned by the Secretariat of the International Treaty on PGRFA, FAO

Whatmore, S., *Hybrid Geographies: Natures, Cultures, Spaces* (SAGE 2002)

Whitt, L., *Science, Colonialism, and Indigenous Peoples: The Cultural Politics of Law and Knoledge* (Cambridge University Press, 2009)

Conflicting Scientific Narratives at the Convention on Biological Diversity and Other Fora: Analysis and Contradiction in the Discussions on Dematerialization of (Plant) Genetic Resources

AUTHOR'S DECLARATION AND ESSENTIAL ETHICAL COMPLIANCES

Author's Contributions (in accordance with ICMJE criteria for authorship)
This article is 100% contributed by the sole author. S/he conceived and designed the research or analysis, collected the data, contributed to data analysis & interpretation, wrote the article, performed critical revision of the article/paper, edited the article, and supervised and administered the field work.

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The author(s) solemnly declare(s) that this research has not involved any human subject (body or organs) for experimentation. It was not a clinical research. The contexts of human population/participation were only indirectly covered through literature review. Therefore, an Ethical Clearance (from a Committee or Authority) or ethical obligation of Helsinki Declaration does not apply in cases of this study or written work.

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